LABIALITY IN MIXTECAN -- A UNIFIED TREATMENT[1]

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0. Introduction

In this paper I analyze data from Mixtecan, a group of Otomanguean languages spoken in the states of Oaxaca, Guerrero, and Puebla, Mexico (Hollenbach 1977, Longacre 1957, Longacre and Millon 1961), concluding that labiality is limited to one autosegment per word. Mixtecan will be shown problematic for theories positing distinct labial features for consonants and vowels (Archangeli and Pulleyblank 1986, Selkirk 1988,1993, Clements 1991, Odden 1992). Instead, this analysis supports a theory of feature geometry which does not distinguish between consonantal and vocalic labiality (Clements 1985, Sagey 1986, McCarthy 1989).

In Section 1 I discuss the patterning of labiality in Proto-Mixtecan (Longacre 1957, Longacre 1962, Longacre and Millon 1961, Rensch 1976, Rensch 1977), concluding that labiality is strictly limited in its distribution. In Section 2 I present data from Trique (Longacre 1957, Hollenbach 1977), concluding that labiality is limited to one instance per word. I reach a similar conclusion regarding the patterning of labiality in Mixtec and Proto-Mixtec (Mak and Longacre 1960). I further conclude that constraints on the distribution of labiality in Trique and Mixtec have their origins in Proto-Mixtecan. In Section 3 I consider the theoretic implications of these findings with respect to the feature-geometric location of the feature [labial].

1 Proto-Mixtecan

Longacre (1957) argues that modern Trique, Mixtec, Cuicatec, and perhaps Amuzgo, are historically derived from Proto-Mixtecan (PMx). His reconstructed segment inventory for PMx is in (1).

(1)		*t		*k	$*k^{w}$	*?	*i	*i	*u
		$*^{n}d$		$*^{n}g$	$*^{n}g^{w}$		*e	(*O)	*o
		*Θ		*x	$*x^{w}$			*a	
	*m	*n	*n						
		*l							

[1]Thanks to Abby Kaun for her helpful comments.

*w *y

*i is a high, close, back, unrounded vocoid. *O is "some sort of low, back rounded vowel"(p.27) whose presence is questionable, as it does not survive in modern reflexes. Longacre (1962) revises the vowel inventory to exclude *O. Rensch (1976,1977) simplifies the system further in his discussion of PMx in the context of Proto-Otomanguean, eliminating *o as well.

The word in PMx normally consisted of a stress-initial bisyllabic root and non-syllabic inflectional material (consisting of tone, length, ablaut, and/or consonantism). This morphological complex is called a "couplet" by Longacre.[2] A couplet's first and second syllables are referred to as "penultima" and "ultima," respectively. Ultimas may have possessed nasal codas.

Longacre reconstructs PMx as possessing a constraint which disallows the co-occurrence of a labial consonant (*m,*w,*k^w,*$^ng^w$,*x^w) and a labial vowel (*u,*o) within the syllable. This constraint is formalized in (2).

(2) *$[$[lab][lab]$]_\sigma$

A further constraint disallows labial onsets in penultimas.

(3) *$[$[lab]V$]_{penultima}$

His list of reconstructed PMx ultimas possesses no instances of syllables with multiple labial specifications, while his list of PMx penultimas possesses no instances of labial onsets. Ultima-final nasals in PMx are reconstructed as *m, although this segment survives in modern reflexes as vowel nasalization, possessing no independent strictural component. Longacre reconstructs a dissimilatory process in which labial and labialized onsets lose their labiality in the presence of a nasal coda (*k^wi - *kim, *x^wa - *xam, *?mV - *?Vm), thus obeying another reconstructed constraint limiting labial consonants to one per couplet.

(4) *$[$[lab C][lab C]$]_{couplet}$

Also, in Mak and Longacre's (1960) discussion of Proto-Mixtec (PM) phonology (derived from PMx), the authors reconstruct specifically bilabial PMx nasal coda is reconstructed to account for the presence of intervocalic [m] in certain modern Mixtec dialects within cognate sets having nasalized vowels in other dialects. Note that these intervocalic bilabial nasals are currently present only when the preceding vowel is itself labial

[2]Employing more modern terminology, it might be possible to replace "couplet" with "foot".

(reconstructed as PM u). Thus we get *kumi* (four) (<PM *kuu*), *tumi* (feather) (<PM *tuu*), but *kan* (to dig) (<PM *kaa*).[3] Given this telling third form, the evidence for labiality in PMx codas would thus seem questionable at best. As we will see in the next section, superficial sequences of *um* egments may be analyzed as deriving from a single labial autosegment.

Given the syllable-internal constraints already discussed (cf.2,3,4), we may conclude that the following couplets were disallowed in PMx (assuminf for the moment that nasal codas were indeed labial):

(5) Disallowed couplets involving labiality in PMx

	C	V	C	V	N
a.	[lab]	X	X	X	
b.	X	X	[lab]	[lab]	
c.	X	X	[lab]	X	[lab]

(where [lab] = any labial, X = any segment)

That is, PMx disallowed couplets with labial onsets in the penultima (5a), as well as couplets with two labials in the ultima, one of which is in onset position (5b,c).

With these constraints holding of PMx, let us consider the possible instances of multiple labial specifications within the PMx couplet.

(6) Possible multiple labial specifications in PMx couplets

	C	V	C	V	N
a.	X	[lab]	X	[lab]	
b.	X	[lab]	[lab]	X	
c.	X	[lab]	X	[lab]	[lab]
d.	X	[lab]	X	X	[lab]
e.	X	X	X	[lab]	[lab]

(where [lab] = any labial segment, X = any non-labial segment)

Given (6), our tentative conclusion regarding the distribution of labiality in PMx couplets is the following: couplets which possess two labial vowels with or without a labial ultima nasal coda (6a,c), or a labial penultima vowel followed by a labial onset (6b), or a labial

[3] Mak and Longacre report that Chigmecatitlan Mixtec possesses *kam* for PM *kaa*, but question the accuracy of the transcription. Post-nasal [i] in these modern forms is assumed "added to a few forms in certain dialects"(1960:p.38).

penultima vowel with a labial ultima nasal coda (6d), or a labial ultima vowel with a labial ultima nasal coda (6e), were all acceptable.[4] In the next section, we will see how a more general constraint may have been operating in PMx, by investigating labiality constraints in modern Trique.

2. Labiality Constraints in Trique

In this section, I investigate labiality constraints in the modern Trique dialects of San Andres Chicahuaxtla, San Martin Itunyoso (Longacre 1957), and San Juan Copala (Hollenbach 1977). The patterning of labiality here will show that the superficial instances of multiple labial specifications that were seemingly allowable in PMx may be illusory, and that Longacre's two distinct syllable-based constraints, and one consonant-based constraint on labial co-occurrence may possibly be superseded by a single constraint limiting labiality to one instance per couplet.

In Trique, couplets are stress-final, indicated by lengthening of open ultimas, with a freer distribution of segments in ultimas than in penultimas. Only the laryngeals /?,h/ may close syllables. The Trique segment inventory is listed in (7).

(7)	p	t			k	i:	u:
	b	d			g	e(:)	o(:)
		sss				a(:)	
		zz		r			
		ccc					
	m	n					
		l					
			y	w			
	?, h						

(/p/ and/b/ occur only in loans. Labiovelars ([k^w], [g^w]) are treated as clusters by Hollenbach (/kw/,/gw/))

Vowels may be constrastively nasalized, and ultima vowels may be laryngeally interrupted, in which /h/ or /?/ intrude on the vowel (i.e., [VhV], [V?V]). Interrupted vowels are distinguished from true sequences of vowel-laryngeal-vowel (often displaying translaryngeal harmony), in that interrupted forms occur in otherwise bisyllabic words, and do not undergo final lengthening. Thus [we?e^3] (/we?e^3/)(house) is monosyllabic, while

[4]See the appendix for a list of reconstructed PMx couplets.

[we^3?e:^{2}] (/we^3?e^2/)(beautiful) is bisyllabic.

The following relevant facts and generalizations regarding labiality in Trique are presented in Hollenbach (throughout, tones are excluded):

(8) a. Labiovelars may occur word-medially.

nukwah	(strong)
dugwah	(to twist)

b. Sequences of [uw] are attested. (Syllable boundaries are indicated by ".".)

yu.wi	(people)
zu.we	(dog)
ru.wa	(squash seed)

c. Only one labial consonant is permitted per couplet, excluding homorganic labial nasal-stop clusters and their free variants. These clusters are limited in their lexical distribution to the loan and mimetic vocabularies:

*[lab] [lab]
[+cons]...[+cons]

but kamba? (furrowed green squash)

(-ma?, -mwa? are also reported as acceptable ultimas in this form, i.e., there is free variation here.)

d. Multiple [labial] specifications are very rarely attested.

i.	roko	(custard apple)
	guku	(Inca dove)
ii.	guno	(to hear)
	uno	(to sow)
	kohnu	(tobacco) (Mixtec loan (Longacre 1957:52))

e. No syllable consists of a labial followed by a round vowel.

*mu *mo *wo *wu

(recall that /m/ is the only native labial contoid)

The data in (8di) are harmonic forms. In (8dii) is an exhaustive list of forms from both

Hollenbach's list (of approximately 150 items) and Longacre's list (of approximately 500 items) which possess sequences of non-identical round vowels. Regarding (8e), Longacre (1957) indicates that this constraint is active in the synchronic grammar, writing that "the semivowel w does not occur before o or u...When morphological combinations would bring together these restricted combinations the semi-vowel is lost"(no examples given)(p.16).

Although the data in (8) indicate that multiple labial segments may be present within the couplet, I will now argue that nearly all forms which superficially possess multiple labial segments may be reducible to a single labial specification.

Consider first the forms in (8a). A generalization that eluded Hollenbach is that medial labiovelars occur with other labials only in very limited circumstances. Specifically, these segments occur with other labials only when immediately preceded by /u/, and immediately followed by a non-labial vowel. Moreover, such sequences seemingly never constrast with non-labialized counterparts, thus, for example, *[uka] is impossible.[5] A sample list of these forms, from both Hollenbach and Longacre, is presented in (9).

(9)	nukwah	(strong)
	dugwah	(to twist)
	dugwane	(to bathe someone)
	rugwah	(hearth stones) (-ruwah)
	dugwe	(to weep)
	dugwi	(together with, companion)
	dukwa	(jail)
	nugwa	(word)
	nukwa	(to stretch (something))
	rugwi	(peach)
	zugwe?ehe	(mattery eyes)
	zugwi	(name)
	zukwa	(snake)

Labiality is thus never contrastive in this environment. I conclude that medial labiovelars acquire their labiality from the preceding labial vowel, and thus these surface forms may derive from a single [labial] autosegment. This is shown in (10).

(10) /uka/ -> [ukwa]

```
        σ     σ
        |     |
        μ     |
        |     |
```

[5]The sole exception to this generalization in Longacre's list is *guki* (yesterday).

```
      [lab][dors]
```

Similarly, [uwV] sequences never constrast with [uV] sequences, and thus involve hiatus resolution in which the labial vowel spreads rightward to provide an onset for the bare vowel syllable (cf.8b)

(11) /ua/ -> [uwa]

```
        σ     σ
        |     |
        μ     μ
        |     |
   [lab]V
```

Hiatus resolution is not present for /iV/ sequences (*nia* (dinner), *rio* (trough): *[iyV]).

Homorganic labial nasal-stop clusters in the loan and mimetic vocabularies may uncontroversially be analyzed as possessing a single [labial] autosegment which is associated to both the stop and the immediately preceding nasal (cf.8c).

(12) /VNbV/ -> [VmbV]

```
        σ      σ
        |      |
   [nas]   [lab]
```

Finally, couplets with identical vowels may be multiply linked for place features (cf.8d).

(13) $[CV_{[lab]}CV_{[lab]}]$

```
        σ           σ
        |           |
        μ           μ
                    |
                 [lab]
```

In Longacre's list, when discounting vocalic tonal, laryngeal, and nasal contrasts, there are approximately 210 segmentally distinct couplets. That is, 210 couplets possess combinations of distinct segments, apart from tonal, laryngeal, and nasal contrasts. 33% of these forms (70 in all) are fully harmonic, i.e., consist of vowels of identical quality. Given the six vowel qualities present in the San Andres Chicahuaxtla and San Martin Itunyoso dialects, we would expect only one couplet in thirty-six to display vocalic identity (2.8%) if there were no tendency toward vowel harmony. Hollenbach, in her discussion of the San Juan Copala dialect states "Although all five long vowels occur in nonultimas, it is almost possible to reduce the number of constrasts in this position to three. In words of native origin, the occurrence of /i u/ or /e o/ respectively, is to a large degree predictable from the ultima vowel..."(p.42). It is for these reasons that positing harmonically derived vocalism in penultimas becomes tenable.

With these representations in mind, the overall generalizations to be made regarding the patterning of labiality in Trique are in (14).

(14) a. All instances of adjacent labial segments are reducible to a single [labial] autosegment (cf. 8b,c,d).

b. Labial contoids never co-occur with labial vocoids (cf.8d,e), and only co-occur with other labial contoids if both derive from a single [labial] specification.

c. Multiple labial specifications in vocoids which are non-string-adjacent are extremely rare (cf.8dii).

The table in (15) summarizes the distribution of labiality in Longacre's list. Only segmentally distinct couplets are considered.

(15)

C	V	C	V	frequency	number of [labial] specifications
X	X	X	X	72	0
[lab]	X	X	X	6	1
X	[lab]	X	X	11	1
X	X	[lab]	X	27	1
X	X	X	[lab]	20	1
[lab]	[lab]	X	X	0	2
[lab]	X	[lab]	X	0	2
[lab]	X	X	[lab]	1	2
X	[lab]	[lab]	X	31	1
X	[lab]	X	[lab]	15	1
X	X	[lab]	[lab]	0	2
[lab]	[lab]	[lab]	X	0	2
[lab]	[lab]	X	[lab]	0	3
[lab]	X	[lab]	[lab]	0	3
X	[lab]	[lab]	[lab]	0	2
[lab]	[lab]	[lab]	[lab]	0	3

As the table in (15) indicates, the vast majority of attested forms may be analyzed as possessing a single [labial] specification. Those couplets which require more than a single specification are exceedingly rare.

Now the distribution of labiality in Trique becomes apparent: assuming the exceptionality of the forms in (8dii), couplets are limited to a single [labial] specification.

(16) Modern Trique labiality constraint

$*[[\text{lab}](...)[\text{lab}]]_{\text{couplet}}$

There are two further exceptions to this constraint in Hollenbach's data. The first, *ru?mi* (charcoal), is in free variation with *ru?wi*, and is thus not a true counter-example. Longacre and Millon reconstruct glottal stop - consonant sequences for PMx, but write that "glottal stop...offered insufficient consonantal barrier and functioned in a sort of quasi-prosodic function [sic]"(1961:p.5). Thus sequences of glottal stop - consonant are best considered laryngealized consonants in PMx. I will assume the same holds of modern reflexes.

The second counter-example, *zume* (barn owl), seemingly does not possess a free variant *zume*, but may be derived historically from PM *zuu*. Longacre's list contains contains two forms with the medial sequence *-um-*, out of a total of 31 which contain medial [labial][labial] sequences.

Longacre's list contains only two more forms which unambiguously possess more than one labial specification.

(17)	a.	maru	(black)
	b.	zumigwi	(world)

Note that in (17b) the domain of multiple labiality exceeds bisyllabicity, and thus does not constitute a true counter-example. The fact that only two forms out of more than 210 segmentally distinct couplets, or less than .4% of the total, contain multiple labial specifications strongly suggests a constraint of the form in (16) limiting the distribution of labiality.

Now observe that similar constraints hold elsewhere in modern Mixtecan languages. In modern Mixtec, while Longacre shows that vowels of identical quality are oft-attested within the couplet, he quotes Pike's (1947) observation that "no combinations of o with u are found"(cited in 1957:p.23). Vocalic labiality in Modern Mixtec thus nearly parallels the pattern in modern Trique. Given the modern cross-dialectal co-occurrence constraint on the distribution of labiality in vowels, we may rather safely assume its origins are from PMx.

Now recall the conclusions of Section 1 regarding multiple labial specifications in

PMx couplets (repeated here as (18)).

(18) Possible multiple labial specifications in PMx couplets

	C	V	C	V	N
a.	X	[lab]	X	[lab]	
b.	X	[lab]	[lab]	X	
c.	X	[lab]	X	[lab]	[lab]
d.	X	[lab]	X	X	[lab]
e.	X	X	X	[lab]	[lab]

(where [lab] = any labial segment, X = any non-labial segment)

Consider first pattern (18a), which allows two labial vowels within the couplet. But we have just concluded that constraints in modern reflexes forbidding such forms is most likely derived from PMx itself. Therefore, pattern (18a) turns out to be unacceptable. This still allows pattern (18b-e), however. Concerning (18b), note that we have already seen that such sequences are in most instances readily derivable from a single labial specification which spreads rightward from the penultima. Therefore, pattern (17b) is not acceptable either. We are thus left with instances of multiple labial specifications involving reconstructed bilabial nasal ultima codas. Mak and Longacre themselves seem far from comfortable with this reconstructed segment, considering evidence for bilabiality here "scanty" (1960:p.30,fn.16). It is also important to recall that these reconstructed bilabials are present in modern Mixtecan only when following labial vowels, and thus their labiality is predictable. Elsewhere, these nasals survive as either coronals or vowel nasalization.

It is quite possible then, that the various labiality constraints argued by Longacre, Pike, and Hollenbach to hold of PMx and certain of its modern reflexes may be subsumed under a single, general constraint on the distribution of labiality.

(19) Possible Mixtecan labiality constraint

$*[[\text{lab}](...)[\text{lab}]]_{\text{couplet}}$

Specifically, [labial] is limited to one instance per couplet.

3. Theoretic Implications

Various theories of feature geometry posit distinct place features for consonants and vowels. Certain of these theories allow for the interaction of labial consonants and labial vowels via "cross-tier assimilations" and "cross-tier dissimilations" (Selkirk 1988, Clements 1991), while another (Odden 1992) predicts the complete independence of consonantal and vocalic labiality.

The labiality constraint present in certain Mixtecan languages limits labiality to one instance per couplet, regardless of the stricture specifications of the segment(s) to which labiality is associated. Mixtecan thus poses an immediate problem for Odden's geometry (shown in (20)).

(20)

```
                          root

          dorsal      .
          labial          .
          coronal         .
          vowel place            .
                            /          \
                         height       back-round
                       / | \           /   \
                    low ATR high     rnd back
```

(20) shows that labiality in consonants is represented as an articulator, sister to [corona] and [dorsal]. Labiality in vowels is a daughter of the Vowel Place node, sister to [back].

Clements (1991) proposes a "consonant-place - vowel-place" geometry (21), that, while still segregating consonantal labiality from vocalic labiality, nonetheless allows their interaction via "cross-tier assimilations" and "cross-tier dissimilations".

(21)

```
                      root
                        |
                      C-place
                      /     \
              articulators  vocalic
              /           /     \
         [labial]    V-place  aperture
              etc.       /
                      [labial]       etc.
```

In this geometry, Clements allows labial consonants and labial vowels to interact in terms of assimilatory and dissimilatory processes despite their being on distinct autosegmental tiers.

Clements' approach would seem to be an attempt at geometrically capturing the distinct phonetic manifestations of labial vowels and labial consonants: while labial vowels are always round, this entailment does not hold for labial consonants. Nonetheless, labial vowels and labial consonants *do* seem to interact (contra Odden 1992). It is apparently for this reason that Clements allows for these distinct features' cross-tier interaction.[6] Yet Clements avoids the problems encountered in Odden's geometry by stipulation only: within Clements' model, despite their phonetic similarity (though non-identity), the only property common to labial consonants and labial vowels is the label [labial]. By extension, we expect interactions between any two features, should they bear like-sounding names. Surely, we do not want such rampant arbitrariness to be allowed into the grammar, and yet Clements' approach would seem to be lifting the curtain on just such a scenario.

The Mixtecan data show no asymmetry between labiality in consonants and labiality in vowels: only one labial specification is allowable per couplet, regardless of whether it is manifested on a consonant, on a vowel, or on both. One geometry which reflects this unification of consonantal and vocalic labiality is presented in Sagey (1986), the relevant components of which are shown in (21).

(21) Place
/ | \\
[labial][coronal][dorsal]

The Mixtecan data may be accounted for by this unified approach to labiality.

4. Conclusion

The constraint on the distribution of labiality in Mixtecan requires reference to both consonants and vowels. This favors a unified approach to consonant-vowel labiality, eschewing the problems associated with positing their segregation.

Appendix

Longacre and Millon (1961) present a brief list of reconstructed PMx forms. All couplets are presented here (monsyllabic forms are omitted).

*^{n}du^{n}di (bean)
*Θo?wa (cacao)
*kO^{n}g^{w}i/
*xO^{n}g^{w}i/
*^{n}dO^{n}g^{w}i/

[6]In most cases stricture alone can determine whether a labial segment will be round or not: labial vocoids are rounded, while labial contoids are not rounded. See Selkirk (1993) for a variant of this approach.

*tO^{n}g^{w}i	(day)
*yawe/	
*Θawe	(maguey)
*ya(m)xi(m)	(maize dough)
*ya?we	(market place)
*yOΘo	(metate)
*xitam?/	
*yitam?	(earth oven)
*yuwe?/	
*Θuwe?	(earth mat)
*k^{w}ano(m)/	
*xino(m)/	
*^{n}dano(m)/	
*kanom/	
*nano(m)	(to plant)
*yami/	
*Θami/	
*Θa?mi	(potato)
*^{n}diΘi	(pulque)
*k^{w}ande/	
*xinde/	
*kande/	
*^{n}dande	(to ripen)
*yOkim?/	
*yOk^{w}i?/	
*ΘOkim?	(squash)
*yunO(m)/	
*xanOm	(tobacco)
*yiko/	
*Θiko/	
*^{n}diko	(twenty)
*k^{w}anO(m)/	
*xinO(m)/	
*kanO(m)/	
*danO(m)	(to weave)

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